PATENT APPLICATION
Mo-6266
LeA 34,259

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

APPLICATION OF	GROUP: 1753
ANDREAS BULAN ET AL	EXAMINER: E. WONG
SERIAL NO.: 09/887,617	
FILED: 06/22/2001	
TITLE: PROCESS FOR PREPARING PERFLUORINATED ORGANIC COMPOUNDS BY ELECTRO-CHEMICAL FLOURINATION	

APPEAL BRIEF

Commissioner for Patents
Alexandria, VA 22313

Sirs:

This Appeal Brief, submitted in triplicate, is an appeal from the Final Office Action dated April 8, 2003, in which Claims 1, 2, 8, 10 and 11 were finally rejected.

I. REAL PARTY IN INTEREST

The real party in interest is Assignee Bayer AG.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences which directly or indirectly affect the present appeal.

III. STATUS OF CLAIMS

Claims 1, 2, 8, 10 and 11 stand rejected.

IV. STATUS OF AMENDMENTS

Claims 1, 2, 8, 10 and 11 stand as amended in an Amendment filed on March 7, 2003.

V. SUMMARY OF THE INVENTION

Appellants' invention is directed to a process for the continuous preparation of perfluorobutylsulfonyl fluoride from a starting material selected from the group consisting of sulfolane, sulfolene, butylsulfonyl fluoride, butylsulfonyl chloride, and mixtures thereof. The process comprises subjecting the starting material to electrochemical fluorination with an electrolyte comprising hydrogen fluoride. The starting material is added continuously and the electrolyte has a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte (Specification, page 3, lines 1-10 and page 4. lines 5-7).

Another embodiment of Appellants' invention is directed to the process as described above, and further includes the hydrogen fluoride has a water content of less than about 300 ppm, a sulfuric acid content of less than about 300 ppm, a sulfur dioxide content of less than about 30 ppm and an arsenic content of less than about 30 ppm (Specification, page page 3, lines 11-17). Appellants' invention provides previously unavailable advantages, as further discussed below.

VI. ISSUES

1. Are Claims 1, 8 and 10 unpatentable under 35 U.S.C. 102(b) as anticipated by Bulan et al. (US Pat No. 5,366,597)?

2. Is Claim 11 unpatentable under 35 U.S.C. 102(e) as anticipated by Heider et al. (US Pat. No. 6,264,818)?

3. Is Claim 11 unpatentable under 35 U.S.C. 102(b) as anticipated by Bulan et al. (US Pat No. 5,366,597)?

4. Is Claim 2 unpatentable under 35 U.S.C. 103(a) over Bulan et al. (US Pat No. 5,366,597) as applied to Claim 1?

VII. GROUPING OF CLAIMS

Claims 1, 2, 8, 10 and 11 stand as a single group.

VIII. ARGUMENTS

Rejection of Claims 1, 8 and 10 under 35 USC 102(b) as anticipated by Bulan et al. (US Pat No. 5,366,597)

The rejection of Claims 1, 8 and 10 under 35 U.S.C. 102(b) as anticipated by Bulan et al. was not established.

It is well settled that a 35 USC 102 rejection must rest upon the literal teachings of a reference and that the teachings must disclose every element of the claimed invention in as complete detail as is contained in a claim. In order for a prior art reference to anticipate a claim, the reference must disclose each and every element of the claim with sufficient clarity to prove its existence in prior art. The disclosure requirement under 35 USC 102 presupposes knowledge of one skilled in art of the claimed invention, but such presumed knowledge does not grant a license to read into prior art reference teachings that are not there. See *Motorola Inc. v. Interdigital Technology Corp.* 43 USPQ2d 1481 (1997 CAFC). Bulan et al. fails to meet this essential requirement.

As discussed above, Appellants' invention provides a process for the continuous preparation of perfluorobutylsulfonyl fluoride from a starting material selected from the group consisting of sulfolane, sulfolene, butylsulfonyl fluoride, butylsulfonyl chloride, and mixtures thereof. The starting material is subjected to electrochemical fluorination with an electrolyte comprising hydrogen fluoride. The starting material is added continuously and the electrolyte has a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte.

The invention provides advantages to the industry. As discussed on page 2, lines 16-20, of the Specification, the invention provides a process for the preparation of perflourinated organic compounds which can be operated continuously over a prolonged period of time and in which the electrode area-time yield does not decrease with time and the formation of polymeric by-products is reduced. In the

process for continuous preparation, the starting material is added continuously during the course of the fluorination, and the electrolyte has a quantity of charge that ranges from about 5 Ah per Kg of electrolyte to about 600 Ah per Kg of electrolyte.

This continuous process of Appellants' invention importantly provides preparation of perfluorobutylsulfonyl fluoride compounds that is continuously operated. Thus, multiple batches of preparation of perfluorobutylsulfonyl fluoride can be continuously processed. Continuous addition of the starting material is done while having a quantity of charge that ranges from about 5 Ah per Kg of electrolyte to about 600 Ah per Kg of electrolyte. The quantity of charge per kg of electrolyte which the electrolyte can still take up without the hydrogen fluoride being converted electrochemically into hydrogen and fluorine is calculated on the basis of the weight of electrolyte and the quantity of charge is determined (Specification, page 6, lines 6-10). If this result indicates that the quantity of charge which the electrolyte can still take up lies outside the range specified according to the invention, the amount of the addition of starting material can be increased or reduced until the quantity of charge to be maintained according to the invention is achieved. This process of Appellants' invention provides a sufficiently high hydrogen fluoride concentration in the electrolyte such that the formation of by-products is largely avoided and high electrode area time-yields are achieved (Specification page 9, lines 14-17).

Bulan et al. does not anticipate Appellants' invention. The disclosure requirement under 35 USC 102 presupposes knowledge of one skilled in art of the claimed invention, but such presumed knowledge does not grant a license to read into prior art reference teachings that are not there. See *Motorola Inc. v. Interdigital Technology Corp.* 43 USPQ2d 1481 (1997 CAFC). Bulan et al. discloses a process for the preparation of perfluorobutylsulponyl floride by electrochemical fluorination. A batchwise process is disclosed in which, the starting material to be fluorinated is *initially* placed in an electrolysis cell at the (col. 2, lines 9-10). In fact, Bulan et al. only discloses determining and providing an amount of starting material at the beginning of the electrochemical fluorination process. The starting material is initially provided in an amount of 2% by weight based on the hydrogen fluoride used, and then is continuously metered into the cell in the requisite stoichiometry (col 2,

lines 15-17). This batch process does not permit adding amounts of starting material, during the process. For each batchwise process, the mixtures of octylsulphonyl fluoride, sulpholane, sulpholene or butylsulphonyl fluoride are electrochemically fluorinated; the amounts to be added are calculated from the reaction equation for the particular substance; and the hydrogen fluoride consumed is replaced. (col. 2, lines 43-49). Therefore, there is not any process of continuous preparation disclosed in Bulan et al. In fact, Bulan et al. further explains the non-continuous batchwise processes by Examples 1-5. Each of the Examples 1-5 illustrates a batchwise process in which an amount of starting material *initially* placed into the cell, and that the exemplary mixture (octylsulphonyl fluoride, sulpholane, sulpholene or butylsulphonyl fluoride) to be fluorinated is continuously metered into the cell in amounts corresponding to the stoichiometry during the batchwise process. Thus, in Bulan et al. each preparation of an amount of perfluorobutylsulponyl floride by electrochemical fluorination is limited to a non-continuous process.

Further, the Examiner alleges that Bulan et al. discloses that "once 'the starting material to be fluorinated is continuously metered into the cell in the requisite stoichiometry' (Bulan, col. 2, lines 14-17), it appears that this is where the starting material is added continuously and the electrolyte has a quantity of charge that ranges from about 5 Ah per Kg of electrolyte to about 600 Ah per kg of electrolyte (Bulan, col. 2, lines 18-41; and cols 2-4, Examples 1-4)." However, Bulan et al. only discloses the batchwise process and <u>not</u> any *continuously operated* electrochemical fluorination process in which the quantity of charge that the electrolyte can absorb is between 50 and 200 Ah per Kg of electrolyte. Bulan et al., provides a predetermined batch amount of starting material to be fluorinated and hydrogen fluoride and a fixed voltage, and <u>not</u> a continuous preparation of perfluorobutylsulfonyl fluoride including adding starting material and maintaining that the electrolyte has a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte of Appellants' invention (Specification, page 6, lines 2-23). In other words, Bulan et al. fails to teach critical steps of Appellants' invention of Claim 1.

Claims 8 and 10 depend from independent Claim 1, which as discussed is

believed to be allowable. Accordingly, Claims 8 and 10 are also believed to be allowable. Reconsideration is requested.

Rejection of Claim 11 Under 35 USC 102(e) as anticipated by Heider et al. (US Pat. No. 6,264,818)

The rejection of Claim 11 under 35 U.S.C. 102(e) as anticipated by Heider et al. was not established.

The Final Office Action indicated that the arguments applied in the Office Action date September 9, 2002 are incorporated herein. Specifically, the Office Action maintained the rejection because Heider et al. discloses that the hydrogen fluoride has a water content of less than 300ppm (=0ppm), a sulfuric acid content of less than 300ppm (=0ppm) and an arsenic content of less than 300ppm (=0ppm). (citing the Office Action dated September 9, 2003). The Final Office Action further indicates "the Appellants state there is nothing in Heider that discloses the sulfuric acid content or arsenic content can be reduced. It is well settled that unpatented claims are given the broadest, most reasonable interpretation and that limitations are not read into the claims without a proper claim basis therefore. In re Prater 415 F.2d 1393, 162 USPQ 541 (CCPA 1969); In re Zeltz 893 F. 2d 319, 13 USPQ 1320" (Office Action, page 5, lines 3-9).

Heider et al's process for preparing perfluoroalkylfluorophosphoranes does not anticipate Appellants' process, as encompassed by Claim 11. Heider et al. discloses a process in which the hydrogen fluoride is treated by preliminary electrolysis. Even if the conclusion could be drawn from this that a hydrogen fluoride with a reduced quantity of water is produced, Heider et al. does not disclose that the sulfuric acid content or arsenic content can be reduced to an amount of less than 300ppm and 30 ppm, respectively. In fact, Heider et al does not specifiy any amounts of sulfuric acid content or arsenic content. One skilled in the art cannot read into the prior art reference teaching that are not there, and thus Heider et al does not anticipate Appellants' invention.

Further, Heider et al. discloses at Column 3, lines 42-44 that the "liquid reaction product is periodically withdrawn and the volume withdrawn is replaced by adding hydrogen fluoride with a new starting material." In other words, Heider et al.

discloses that non-fluorinated or partially fluorinated compounds are introduced non-continuously and that their process is not continuous. Accordingly, Heider et al. does not place Appellants' process in the possession of the public. Withdrawal of the rejection is requested.

Rejection of Claim 11 under 35 U.S.C. 102(b) as anticipated by Bulan et al. (US Pat No. 5,366,597)

The rejection of Claim 11 under 35 U.S.C. 102(b) as anticipated by Bulan et al. was not established.

As discussed above in regard to the rejection of Claim 1 under 35 U.S.C. 102(b) as anticipated by Bulan et al., Bulan et al does not disclose every element of Appellants' invention. Bulan et al. does not disclose a process for the continuous preparation of perfluorinated organic compounds including electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte including hydrogen fluoride that has a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte.

Furthermore, Bulan et al does not disclose any specified amount of water, sulphuric acid or sulphur dioxide. Further, Bulan et al. does not disclose "the hydrogen fluoride has a water content of less than about 300 ppm, a sulfuric acid content of less than about 300 ppm, a sulfur dioxide content of less than about 30 ppm and an arsenic content of less than about 30 ppm" of Appellants' Claim 11. Thus, Bulan et al. does not teach every element of the Appellants claimed invention with sufficient clarity to prove its existence in prior art. Withdrawal of the rejection is requested.

Rejection of Claim 2 under 35 U.S.C. 103(a) as unpatentable over Bulan et al.

The rejection of Claim 2 under 35 U.S.C. 103(a) as unpatentable by Bulan et al. should be withdrawn. It is well established under 35 USC 103 that to establish a *prima facie* case of obviousness, the USPTO must satisfy all of the following requirements. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or

incentive that would have motivated the skilled artisan to modify a reference or to combine references. *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir.1988). Second, the proposed modification must have had a reasonable expectation of success, as determined from the vantage point of one of ordinary skill in the art at the time the invention was made. *Amgen v. Chugai Pharmaceutical Co.* 18 USPQ 2d 1016, 1023 (Fed Cir, 1991), *cert. denied* 502 U.S. 856 (1991). Third, the prior art reference or combination of references must teach or suggest all of the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496, (CCPA 1970). The Final Office Action did not establish a *prima facie* case of obviousness.

The Final Office Action indicates that Claim 2 recites that the quantity of charge is kept in the range from about 50 to about 200 Ah per Kg of electrolyte. The Final Office action alleges that this is well within the skill of the skilled artisan because the quantity of charge is a result-effective variable and one skilled in the art has the skill to calculate the quantity of charge that would determine the success of the desired reaction to occur, eg. perfluorination, citing the MPEP §2141.03 and §2144.05(b) (Final Office Action, page 9. lines 1-4).

In Appellants' invention, the process for continuous preparation, the starting material is added continuously during the course of the fluorination. Further, the off-gas from the cell is analyzed for oxidizing constituents at regular intervals and when the first oxidizing compounds are detected in the off-gas, the electrolysis is stopped and the quantity of charge is determined. The quantity of charge per kg of electrolyte which the electrolyte can still take up without the hydrogen fluoride being converted electrochemically into hydrogen and fluorine is calculated on the basis of the weight of electrolyte and the quantity of charge is determined. If this result indicates that the quantity of charge which the electrolyte can still take up lies outside the range specified according to the invention, the addition of starting material has to be increased or reduced until the values to be maintained according to the invention are achieved. The electrolyte has a quantity of charge that ranges from about 50 Ah per Kg of electrolyte to about 200 Ah per Kg of electrolyte. This process of Appellants' invention is critical because a sufficiently high hydrogen fluoride concentration in the electrolyte is provided such that the formation of by-products is

largely avoided and high electrode area time-yields are achieved (Specification, page 6, lines 2-17).

Thus, in regard to the allegation in Final Office Action that the "quantity of charge is a result-effective variable," such a result-effective variable is not established in Bulan et al. A particular parameter must be first recognized as a result-effective variable, ie. a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Bulan et al. does not teach or disclose the recognized result.

The Office Action alleges that the electrolyte has a quantity charge of 5Ah to about 600 Ah per Kg of electrolyte, citing Bulan et al. col. 2, lines 18-41 and col. 2-4, Examples 1-4. However, Bulan et al. does not teach or suggest these ranges, but simply provides unique values of Ah per Kg of electrolyte for a non-continuous batchwise process and for a given amount of staring material and electrolyte. In fact Bulan et al. teaches away from the claimed invention by disclosing a batchwise process and a specific value for each example, rather than a continuous process and range of quantity charges of Appellants' invention. In fact, in Appellants' invention the quantity charge in the range of about 5 Ah to about 200 Ah per Kg of electrolyte is critical because it achieves unexpected results in a continuous process that has a sufficiently high hydrogen fluoride concentration in the electrolyte is provided such that the formation of by-products is largely avoided and high electrode area time-yields are achieved.

Thus, using Bulan et al., the quantity of charge is not a result-effective variable and one skilled in the art would not have the skill to calculate the quantity of charge that would determine the success of the desired reaction to occur, e.g. perfluorination, as otherwise alleged in the Final Office Action. Accordingly, no *prima facie* case of obviousness is supported. Withdrawal of the rejection is requested.

IX. CONCLUSION

Applicants' invention is neither anticipated nor obviated by the applied art. Applicants' invention is related to a process for the continuous preparation of perfluorobutylsulfonyl fluoride compounds in which the starting material is continuously added. Also, another embodiment of Applicants' invention is directed to a process for the continuous preparation of perfluorobutylsulfonyl fluoride compounds including a sulfuric acid content of less than about 300 ppm and an arsenic content of less than about 30 ppm.

Neither Bulan et al nor Heider et al anticipate or obviate Applicants' invention. Bulan et al only teaches a batchwise process which is not continuous and in which a predetermined amount of starting material is provided to the batchwise process. Heider et al teaches a non-continuous process in which the reaction product is periodically withdrawn and replaced with a new starting material.

Further, neither Bulan et al nor Heider et al teach or suggest any process of a reduction of sulfuric acid to less than 300 ppm or arsenic content to less than about 30 ppm, of Applicants' invention.

In view of the amendments and remarks above, withdrawal of all rejections is earnestly requested.

Respectfully submitted,

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APPENDIX: CLAIMS ON APPEAL

1. (Previously Presented) A process for the continuous preparation of perfluorobutylsulfonyl fluoride from a starting material selected from the group consisting of sulfolane, sulfolene, butylsulfonyl fluoride, butylsulfonyl chloride, and mixtures thereof, the process [perfluorinated organic compounds] comprising subjecting the starting material to electrochemical fluorination with an electrolyte comprising hydrogen fluoride [electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compounds with an electrolyte comprising hydrogen fluoride that], wherein the starting material is added continuously and the electrolyte has a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte.

2. (Original) The process according to Claim 1, wherein the quantity of charge is kept in the range from about 50 to about 200 Ah per kg of electrolyte.

3. Cancelled.

4-7. Cancelled.

8. (Original) The process according to Claim 1, wherein the current density at which the electrolysis is carried out is from about 5 to about 40 mA/cm^2 and the voltage is from about 5 to about 10 volts.

9. Cancelled.

10. (Original) The process according to Claim 1, wherein the hydrogen fluoride used has an arsenic content of less than about 10 ppm.

11. (Previously Presented) A process for the continuous preparation of perfluorinated organic compounds comprising electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte comprising hydrogen fluoride that has a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte, wherein the hydrogen fluoride has a water content of less than about 300 ppm, a sulfuric acid content of less than about 300 ppm, a sulfur dioxide content of less than about 30 ppm and an arsenic content of less than about 30 ppm.